DOCUMENT RESUME

ED 124 903 CS 002 749

AUTHOR Tomlinson, Barbara; Tomlinson, Michael
TITLE Integrating Reading and Study Skills into College Biology.
PUB DATE 75
NOTE 8p.; Paper presented at the 1975 National Reading Conference

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Academic Achievement; *Biology Instruction; *College Freshmen; *Content Reading; Higher Education; Noncredit Courses; Reading Skills; *Remedial Courses; *Study Skills

ABSTRACT

In order to help college students in their transition to college level work in biology and to increase their achievements in that field, a special reading and study skills adjunct course was organized. The course focused on the methods and materials of the introductory course for biology majors and attempted to build the students' skill foundations for later transfer to independent science reading. Students attended the course on a voluntary, no-credit basis three times a week for eight weeks. A preliminary study of the effectiveness of the course conducted during the 1974-75 academic year indicated significant achievements by the adjunct class. A subsequent study in the fall quarter of 1975 indicated that courses which integrate the teaching of reading and study strategies with content material may be effective in increasing freshman achievement. (JM)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED124903

U S DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Barbara Tomlinson
Director/Learning & Study
Skills Center
University of California, Riverside
Riverside, California 92502

PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY
Barbara Tomlinson
Michael Tomlinson
TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER.

INTEGRATING READING AND STUDY SKILLS INTO COLLEGE BIOLOGY

Barbara Tomlinson
University of California at Riverside

Michael Tomlinson
Riverside, California

Students entering into the study of biological science at the college level need to develop skills in the special techniques of reading and studying science material to make the best use of their academic potentials. Many students who encounter the regorous demands of introductory courses in biology and chemistry find themselves struggling and disappointed in their first quarter of college work. In order to smooth their transition to college level work in biology, and to increase their achievements in

Note: Special thanks must go to several faculty and staff members of the University of California at Riverside: to Dr. Harry Singer, Professor of Education, whose course "Reading in the Content Areas" gave me both the background and the impetus for this project and paper; to Dr. Robert Gill and the Committee for Teaching Excellence, for providing me with a grant through which the project was developed; to Drs. Gregory K. Snyder, Roger Farley and Carl Bovell for their cooperation; and to Charles Huszar, Senior Statistician, Department of Statistics, for his kind review of my statistical procedures.

CS002 799

that field, a special reading and study adjunct course was organized around the lectures and text of Biology 4A, the introductory course for biology majors. The course, focusing on the methods and materials of such presentations, attempted to build in the student a foundation of skills for later transfer to independent science reading.

Analysis and subsequent teaching of the skills needed to read, understand and learn the text and lecture material for Biology 4A was based on suggestions gleaned from Adams (1970), Dechant (1973), Hanf (1971), Herber (1970), Joffee (1970), Manzo (1969), and Maxwell (1970). The adjunct class was then designed to teach these skills in conjunction with their actual occurance in the text assignments, with attention to such skills as surveying and constructing an overview map, analyzing text material for comprehension, developing vocabulary through context and systematic study, analysis of Greek and Latin roots, establishing understanding of diagrams and graphs, and developing skills of self-questioning at the literal, interpretive and integrative levels. Study skills such as concentration and remembering techniques and effective test-taking strategies were taught much as suggested by Raygor and Wark (1970), Voeks (1970), and Millman and Pauk (1969).

A second very important component of the course was the lecture review. The adjunct class instructor attended all biology class lectures, then provided the adjunct class with a series of questions based on these lectures during the initial stages of the adjunct class. Transfer to independent work and independent question-making was attempted through the teaching of note-taking skills and through integration of previously learned self-questioning skills. In a voluntary class it is of supreme importance to maintain student interest, and the review questioning procedures

contributed greatly to this end by providing an obvious link between content class and study strategies.

Instructors of the reading and study adjunct course included both a reading specialist and an advanced undergraduate or graduate student in biology. Students were therefore assured of an approach based on research and good practice in college reading and study skills, and an accurate analysis of text and lecture information. Close contact with the biology professor and attendance at the biology class by the adjunct class' student instructor kept the experimental class discussion linked to current topics. Students attended the course on a voluntary, non-credit basis. Classes met three times per week for eight weeks, Usually the first part of each session was devoted to development of reading and study techniques, while the latter part was focused on practice of self-questioning techniques, as a group or in triads. Students attending 50% or more of the sessions were analyzed as part of the adjunct class group. Students who who dropped out of the adjunct class (approximately 15-20%) were not included in the analysis.

Preliminary Study.

A preliminary study of the effectiveness of such a course integrating reading and study skills with college biology took place during the 1974-5 academic year. Of the thirty students who enrolled for the adjunct class in the Fall quarter, 1974, 18 attended a majority of the sessions. These students were found to have increased their average from seven points below that of the total class on the first mid-term (which was given immediately after enrollment in the adjunct class), to slightly above the class average. Students were found to be at class average at the end of the subsequent course in the biology series. More adjunct students "persisted" to complete the second quarter of freshman biology; the drop-out rates were 5%

and 31% for the two groups. However, in this preliminary study these students were all volunteers, who were compared to a group which had chosen not to volunteer. Any analysis (which indicated that the differences were significant), must be biased to an unknown degree by such factors as motivation.

Method.

When the adjunct class was offered to the students of Biology 4A in the Fall quarter of 1975, 120 students chose to enroll in the course. Since the staff of the Learning and Study Skills Center was unable to accomodate the entire group, the students were divided into separate sections according to time schedules. Students could usually attend one of six sections. Schedules were reviewed to determine whether a particular course in another science area was "influencing" the schedules and introducing a bias. Such a course was not found. Three sections were then chosen, the students who were thereby excluded becoming the control students. Both groups were therefore equally volunteers, equally motivated to improve their skills in the adjunct class, but the control group was prevented from doing so by the limit on number of sessions offered. To verify whether the groups were actually equal in ability, their verbal and math Scholastic Aptitude Test scores were compared. The results of this comparison, appearing on Table I, indicate that the groups did not differ statistically on these measures, although the control group had slightly higher scores (Verbal: t=.591, df= 98 , p= n.s.; Math: t= .758 , df= 98 , p= n.s.).

TABLE I
Scholastic Aptitude Test Scores

	VERBAL			MATH		
	N	Mean	SD	N	Mean	SD
Adjunct	56	492.59	89.78	56	534.43	83.19
Non-Adjunct	44	504.04	98.38	44	548.55	99.10

Results

Students in the adjunct class totaled 59, while 45 students were in the control group. Scores of the two groups on the course mid-term were subjected to analysis of variance to determine the effectiveness of the reading and study adjunct class. Students enrolled in the adjunct course received significantly higher scores on the midterm than the control group ($F = 11.82$, $df = 1, 102$, $p < .005$).

TABLE II
Means and Standard Deviations on Mid-term Examinations
Separated by Group

	N	Mean	SD
Adjunct	59	43.95	9.12
Non-adjunct	45	36.69	12.42

TABLE III
Analysis of Variance on Mid-term Scores
Separated by Group

Source Of Variation	SS	df	MS	F	p
Between	1345.66	1	1345.66	11.82	<.005
Within	11612.50	102	113.85		

Discussion

Evidence from this study indicates that such courses, which attempt to integrate the teaching of reading and study strategies with content area material, may be effective in increasing freshman achievement. Further evidence will be obtained to determine if these achievement gains persist, transfer to other classes, or encourage students to continue in the biology sequence. At this point it is impossible to tell how any individual strategy may have affected the overall results. It may

be that skills which are not internalized by the student when taught in the setting of the traditional multi-disciplinary study skills workshop may be more readily incorporated when thoroughly practiced as part of an integrated adjunct class. Students enrolled in the course did, however, express particular satisfaction with the review questioning procedures, the text self-questioning, and the subject-matter area vocabulary development. In any case, the program will be less effective if the students do not become efficient, active, independent studiers after experiencing the adjunct class.

Any analysis of the effects of an adjunct course cannot be completely generalizable to other populations, even those at colleges and universities similar to the University of California at Riverside. This limitation in generalizability occurs because, as in many experiments with "curriculum", we may be testing a specific set of curricular materials and activities rather than a concept. If the adjunct class instructors do not develop rapport with the students, if the skills are presented less definitively or are not readily incorporated into student study strategies, effectiveness may be reduced. If the relationship between biology professor and adjunct class instructors fails to supply the information needed for close links between the two classes, such a program may fail to influence student achievement. However, if these criteria can be met, perhaps we are truly testing the concept of content area reading instruction at the college level.

REFERENCES

Adams, W.R. How to read the sciences. Glenview, Ill.: Scott, Foresman, 1970.

Dechant, E. Reading improvement in the secondary school. Englewood Cliffs, N.J.: Prentice-Hall, 1973.

Hanf, M.B. Mapping: A technique for translating reading into thinking. Journal of Reading, 1971, 225-230, 270.

Herber, H. Teaching reading in the content areas. Englewood Cliffs,N.J.: Prentice-Hall, 1970.

Joffe, I. Opportunity for skillful reading. Belmont, Ca.: Wadsworth Publishing Co., 1970.

Manzo, A.V. The ReQuest procedure. Journal of Reading, 1969, 13, 123.

Maxwell, M.M. Skimming and scanning improvement. New York: McGraw-Hill, 1970.

Millman, J. and W. Pauk. How to take tests. New York: McGraw-Hill, 1969.

Raygor, A. and D. Wark. Systems for study. New York: McGraw-Hill, 1970.

Voeks, V. On becoming an educated person. Philadelphia: W.B. Saunders Co, 1970.